

Original article

Effects of biofloc in snakeskin gourami (*Trichogaster pectoralis* Regan) culture system on growth performance and fillet quality

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Introduction

Biofloc technology is the culture technique that has been widely studied and applied in an aquaculture. Due to the pond environment is deteriorated and the culture area has been decreased. The demand of fish consumption has increased hence using the biofloc technology in aquaculture is focus [1]. Because of the climate change and sustainable aquaculture concern on water quality and water supply, an international researcher has studied on the culture technique for high growth performance and high production of fish and shrimp by low exchange water during an intensive culture. Applies a microorganism in the water for decomposed organic nitrogen and reducing ammonia to become a protein for microorganism, it is useful for aquatic animals. This microorganism system is called floc. A floc is a group of condense heterotrophic bacteria which is natural food becomes a suspended sediment in the pond for aquaculture. Size of floc is 0.2–2.0 mm. It is assimilation of excreted dissolved for a new cells. The function of floc is reducing organic waste like ammonia, organic matter for improving water quality and also floc is the microorganism so that it is the protein. Floc has a protein content around 25% that can be feedstuff for aquatic animal. Hence, the floc is useful for shrimp and fish culture especially in intensive culture.

Snakeskin Gourami (*Trichogaster pectoralis* Regan) is one of the popular fish species in South East Asia: Thailand, Indonesia, Vietnam, and Cambodia. The trend of snakeskin gourami culture is famous and increases because this fish is high price, good taste, moderate fast growing and resistant to the environment. The production of snakeskin gourami mainly process to be dried salted fish. To improve the snakeskin gourami production and fish quality, culture fish by using natural food like biofloc in intensive culture is evaluated.

The aim of study is focusing on effects of biofloc in snakeskin gourami culture system on growth performance and fillet quality

Materials and methods

Experimental design

The experiment was assigned in 2X2 factorial and four replicates for each treatment. Two protein level diets (factor A) composed by high digestibility materials were applied to snakeskin gourami in intensive system with and without biofloc (factor B). The treatments were T1: High nutrient density diet of 38% CP without biofloc, T2: High nutrient density diet of 38% CP with biofloc, T3: Normal nutrient density diet of 28% CP without biofloc, T4: Normal nutrient density diet of 28% CP with biofloc.

Experimental diets

All experimental diets were formulated by using fishmeal and poultry meal 15%, wheat gluten, natural food, and deoil-rice bran 22.7%, vegetable oil 3%, premix 3.8%, including soybean meal 39% and 23% in diet of 38% CP and 28% CP, respectively, and tapioca 16% and 32% in diet of 38% CP and 28% CP, respectively. These diets contained satisfied nutrients for snakeskin gourami [2].

Experimental conditions

Four hundred and eighty snakeskin gourami with average weight of 72.28 ± 1.80 g. were obtained from a private farm in Thailand. Fishes were acclimated for one week then divided into fiber tank at the density of 15 fish per 1,000 L tank with water of 500L (30 fish per m³). Fish were fed test diets twice a day at feeding rate of 2% body weight per day. Fish were cultured in semi-closed system without and with biofloc at the suspended level of 100 mg/L. Culture tank were filled freshwater and adjust the floc density at 100 mg/L every week. The culture period was 12 weeks.

Data collection

All fishes were anesthetic by the clove oil before sampling from each tank every two week and recorded the feed consumption for evaluate the growth

performance and immunity. Fillet quality was determined.

Statistical analyses

All the data was subjected to factorial analysis of variance (ANOVA) and analysed by using statistical package. Duncan's Multiple Range Test (DMRT) was applied for compared the significant differences among treatment means at 95% confident interval.

Results and discussion

The effects of biofloc in snakeskin gourami culture system on growth performance and fillet quality was conducted. The results in Fig. 1 showed that snakeskin gourami fed 38% crude protein diet with biofloc exhibited the highest growth performance ($p < 0.05$) and low feed conversion ratio (FCR; $p < 0.05$). The biofloc contributes significantly to the growth of fish similarly to the results observed in Tilapia [3] and Avnimelech et al. [4] which reported that the FCR in tilapia with biofloc treatment pond was lower than that in the control because the high feed utilization results in a low ration of 20% less than conventional amounts. The high protein diet (38%) demonstrated the high serum protein and hematocrit ($p < 0.05$). In Nile Tilapia Long et al. [5] had reported some effects of biofloc on fish immune response.

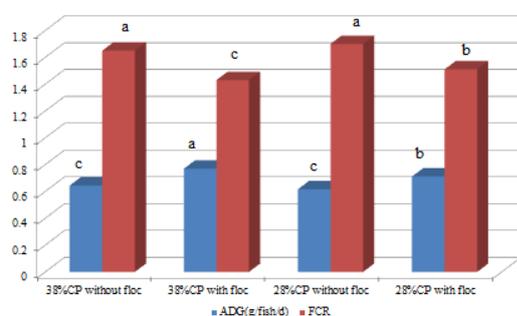


Fig. 1. Growth performance of snakeskin gourami fed high protein of 38% and normal protein of 28% diet with and without biofloc in intensive culture system.

For fillet quality, the biofloc in culture system both high and normal protein diet groups in Fig. 2 improved fillet yield ($p < 0.05$) and fillet water holding capacity by reducing drip loss at 72 hr. ($p < 0.05$). Moreover, the biofloc can increase ($p < 0.05$) the whiteness (L^*) of snakeskin gourami skin in fresh fish and dry salted fish. The proximate composition of whole body snakeskin gourami by A.O.A.C. [6] showed the low moisture, high protein and ash ($p < 0.05$) in group of fish fed high protein diet (38%). The high lipid oxidation (TBA) in dry salted fish after chill at 4°C for 72 hr ($p < 0.05$) exhibited in snakeskin gourami fed high protein diet with biofloc.

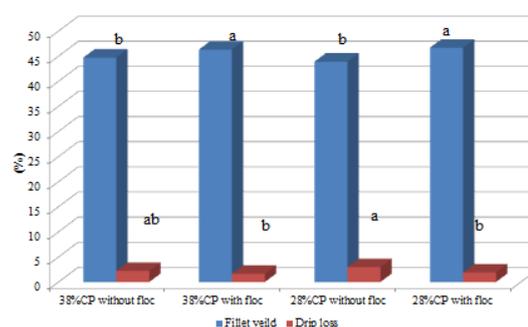


Fig. 2. Fillet yield and drip loss of snakeskin gourami fed high protein of 38% and normal protein of 28% diet with and without biofloc in intensive culture system.

Therefore, feeding snakeskin gourami with high nutrient diet incorporation with biofloc in intensive culture system can promote growth performance, feed utilisation and fillet quality.

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